

# Optimizing VMware Virtualization Solutions With IBM System Storage DS4000 and DS5000



## DS5000 Solutions Guide

### The Benefits of Virtualization

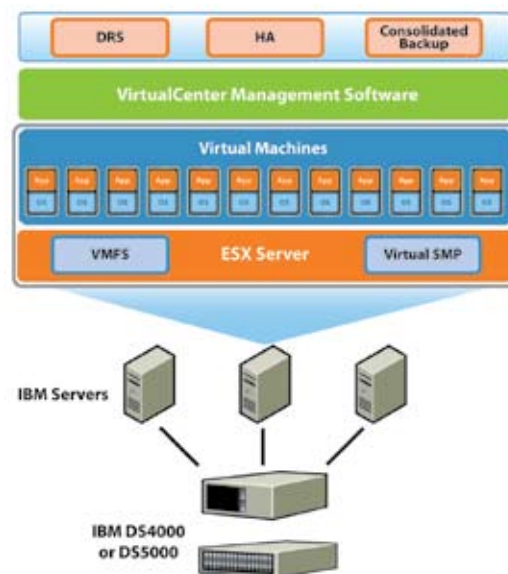
Building a virtualized enterprise with VMware Infrastructure reduces IT infrastructure costs, speeds IT response to business demands, improves IT services levels, and facilitates more consistent business operations. Realizing these benefits requires a shared storage foundation that contributes to an optimized VMware infrastructure. The challenge for IT is to achieve the full potential of VMware benefits, which in turn demands the right storage solution.

### DS4000 and DS5000 Storage Solutions

VMware enables the consolidation of application processing to maximize server utilization and reduce operational costs. Using virtualization, multiple Virtual Machines run simultaneously and independently

on one or more shared processors. Virtual Machines can be shifted between physical servers in a VMware resource pool with no downtime, allowing them to be dynamically and automatically allocated to the most appropriate host in order to achieve target service levels.

This virtualization requires a shared storage infrastructure that enables VMware functionality such as High Availability clusters, VMotion, Resource Pools, Dynamic Resource Scheduler and Site Recovery Manager. The VMware storage foundation supports and complements the VMware Infrastructure by allowing boot from SAN, providing multiple paths for failover, consolidating storage, increasing storage utilization, and reducing the total cost of storage ownership.



The IBM DS4000 and DS5000 series offers additional capabilities that go beyond what other disk storage systems can provide in a VMware Infrastructure. These important capabilities, summarized below, qualify the IBM System Storage DS4000 and DS5000 as the right storage solution to achieve more VMware benefits.

*“In conjunction with VMware, IBM has certified all models of the DS4000 and DS5000 series with ESX Server 3.5 and ESX Server 3i. The certification tests demonstrated interoperability, boot from SAN, and multipathing for failover of HBAs and storage ports as well as interoperability with SRM 1.0 ( Site Recovery Manager).”*

- Extensive upgradability, impressive scalability. The DS4000/DS5000 series is a modular family of disk storage systems that has a common management interface, uses a common drive enclosure, and provides identical functionality across models. Utilizing industry-unique DACstore technology, data written by one controller is recognized by all other controllers in the family, which enables data-intact reconfigurations, migrations and upgrades. This means the smallest DS4200 can be upgraded with data intact to a 224-drive DS5000 that features up to 168 TB of physical storage capacity, 32 or 16 GB of controller cache, sixteen host (SAN) ports and sixteen drive ports. The extensive upgradability of the DS4000 and DS5000 series allows you to “pay as you grow” in a VMware Infrastructure.

The powerful DS5000 was designed for balanced performance capable of handling numerous applications that demand mixed transaction and sequential workloads. As Virtual Machines proliferate, you can add drives to scale I/O performance, throughput and capacity since the DS5000 never becomes controller bound. This impressive scalability feature further enhances your ability to “pay as you grow” in a VMware Infrastructure while maintaining service levels.

- Virtual partitioning, cost-effective tiering. DS4000 and DS5000 storage partitioning allows the DS5000 to logically function as 512 virtual storage systems with up to 131,000 logical drives. Virtual storage systems leverage the virtualization capabilities of VMware by simplifying the mapping of Virtual Machines to storage.

DS4700, DS4800 and DS5000 disk storage systems support an intermix of high performance Fibre Channel drives and high capacity SATA drives, enabling tiered storage in a single system. Combined with storage partitioning, tiered storage allows storage classes to be created that better match storage characteristics to application requirements. One such example is to use one partition for production data while a second partition is used for backup or data protection purposes. Such storage classes can lower storage costs while meeting application performance requirements. Together, tiered storage and partitioning promote storage consolidation, lower storage costs, and can raise Virtual Machine service levels in a VMware Infrastructure.

- Enhanced availability. Besides typical availability features such as RAID (including RAID 6), redundant/hot-swappable parts, online firmware upgrades, controller failover, the DS4000 Series offers additional capabilities that help enhance the availability of storage in a VMware Infrastructure.
  - Dynamic Capacity Expansion allows disk drive expansion units to be added for capacity and performance scaling without impacting Virtual Machines and the applications they host.
  - Dynamic RAID Level Migration permits the RAID level of an array group to be changed for performance tuning without interrupting user access to data.
  - Dynamic Segment Size Migration allows the data stripe size of an array group to be changed nondisruptively in order

to further tune performance.

The advanced availability features of the DS4000 Series can help raise Virtual Machine service levels in a VMware Infrastructure. They also contribute to “pay as you grow” cost savings.

- Outstanding performance. The DS4000 and DS5000 series features end-to-end 4 Gb Fibre Channel technology for faster data access and faster migration of Virtual Machines to different physical servers.

No modular storage system performs better in a VMware Infrastructure than the DS5000—it is the performance leader as demonstrated by industry-standard IOPS and MB/s benchmarks.

The DS4000 Series is designed to provide outstanding performance for transaction processing, data streaming and high performance computing.

### **DS4000 and DS5000 Business Value in a VMware Infrastructure**

With IBM System Storage DS4000, you can solve the business challenge of achieving more VMware benefits because you'll have the right storage solution working for you. The benefits of a DS4000/DS5000 shared storage foundation for VMware are real and significant, as summarized below.

- Achieve Greater Optimization of Your VMware Infrastructure. Ability to lower overall costs of your VMware storage foundation by (1) consolidating storage through a SAN infrastructure, (2) enabling a “pay as you grow” storage upgrade strategy, (3) leveraging server virtualization with virtual storage systems, and (4) simplifying

storage management. Minimize the number of disk storage systems required even as your VMware capacity and performance needs increase—thus cutting storage acquisition costs and recurring costs for maintenance, floor space, power and cooling. And with DS5000 4 Gb technology, you also have investment protection. Increase the storage performance of your VMware Infrastructure with the modular storage benchmark leader. The DS5000 was designed for continuous scalability of both throughput and I/O performance up to the maximum configuration of 224 drives.

Tailor storage characteristics to application requirements by implementing tiered storage and storage classes in disk storage systems as well as the SAN.

Maximize your storage price/performance while lowering your total cost of storage ownership.

- **Leverage Your Business Information.** Improve accessibility to your valuable business data with a DS4000/DS5000 SAN infrastructure that features extensive interoperability, is specifically certified for a VMware Infrastructure, and allows any Virtual Machine to access any virtual storage system and any logical disk if authorized.

Simplify data management with tiered storage that enhances data protection and recovery and supports popular data management software (including IBM TSM).

- **Reduce IT Risk.** Help increase the availability and corresponding service levels of applications that

run on Virtual Machines with DS4000 and DS5000 Dynamic Capacity Expansion, Dynamic RAID Level Migration and Dynamic Segment Size Migration.

Contribute to the availability of your VMware Infrastructure storage foundation.

- **Enable Business Flexibility.** Expand the agility of your VMware Infrastructure with (1) storage partitioning that simplifies Virtual Machine configuration and migration, (2) nondisruptive storage upgrades that permit reuse of common parts and keep data intact, and (3) the ability to scale I/O performance without encountering storage controller bottlenecks.

Increase the resilience of your VMware Infrastructure with advanced, high availability storage features and dynamic expansion capabilities.

### For More Information

To learn more visit the IBM Web site at [www-03.ibm.com/systems/storage/disk/index.html](http://www-03.ibm.com/systems/storage/disk/index.html) or the VMware Web site at [www.vmware.com](http://www.vmware.com).



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